

## NEW SYNONYMY IN DIPLOTAXIS (COLEOP., SCARABAEIDAE).

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During the course of a study of the species of the North American genus *Diplotaxis* (subfamily Melolonthinae) found in north central Mexico and southwestern United States, many species from other regions in these countries and in Central America were also examined. Comparative study of this material revealed a number of synonyms, but only synonymy of forms found in the United States is discussed in this paper. Examination of the large series of *Diplotaxis* in the American Museum of Natural History (over 10,000 specimens from Mexico alone) has shown that individual variability in the genus is far greater than was hitherto supposed; therefore many forms which were described on but one or two specimens are now found to be no longer valid.

*Diplotaxis* is an exceedingly difficult genus taxonomically, the 150 or more species being all unicolorous (black or reddish or buffy), without pattern, of the same general shape, and with most the distinguishing characters either relative, inconstant, or difficult to see. Some species are pubescent dorsally, the majority are glabrous, some few have nine instead of ten antennal segments, a few have a chitinous ridge laterally on the abdomen, some have thick hairy pads on the tarsi, some have the labrum bilobed, and in some species the males have distinctive secondary sexual characters.

Through the courtesy of Dr. K. Delkeskamp of the Zoologisches Museum in Berlin, the 27 types of Moser's Mexican species described in 1918 and 1921 were made available for comparison, and I am very grateful to Dr. Delkeskamp for this opportunity. I also wish to thank Dr. P. J. Darlington, Jr., of the Museum of Comparative Zoology, for comparing the types of some of Fall's species and for giving locality data on others, and Dr. M. A. Cazier of the American Museum of Natural History for criticism and suggestions made in a reading of this paper.

### *Diplotaxis ingenua* Fall

*Diplotaxis ingenua* Fall, 1909, Trans. Amer. Ent. Soc., vol. 35, p. 65, pl. 1, figs. 32, 34.

*Diplotaxis rufocastanea* Moser, 1918, Stettiner Ent. Zeit., vol. 79, p. 307. (New synonym.)

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*Diplotaxis fusca* Moser, 1918, *Ibid.*, vol. 79, p. 312. (New synonym.)

*Diplotaxis futilis* Fall, 1932, *Jour. New York Ent. Soc.*, vol. 40, p. 194. (New synonym.)

Type locality, Huachuca Mountains, Arizona. Type in Museum of Comparative Zoology. Distribution, Arizona and north-western Mexico.

This is one of the small glabrous species with the claws abruptly bent and toothed subapically, the clypeus slightly emarginate, its angles rounded, the labrum densely punctured and somewhat hollowed out, the pygidium grooved behind. Fall's *futilis* was described from a single specimen from Nogales, Arizona. A homotype from the same locality has been compared with two homotypes of *ingenua* Fall from the Pinal Mountains, Arizona, and with 18 topotypes from the Huachuca Mountains, and with many other specimens from Arizona, Sonora, Chihuahua, and Durango. Although these specimens show considerable individual variation in color, in the shape of the pronotal margins, in the punctuation of the scutellum, pygidium, and abdomen, and in the degree of tumidity (when present) of the abdomen, they appear to represent but one species, *ingenua*.

Examination of the types of Moser's *rufocastanea* and *fusca* (type locality of both forms, Mexico) shows them to be also this species. The only difference between these two specimens, other than the slightly smaller size of the former (8 mm. instead of 8.5), is that the type of *rufocastanea* is a male and therefore, as is true of males and females in certain groups of *Diplotaxis*, has the pygidium somewhat more transverse than in the female, and with its apex rounded, less pointed. The pygidium is also retracted in the male and the fifth abdominal segment at center is shorter than the fourth, whereas in the female these segments are about the same length. Moser's descriptions of these two forms, although separated in his paper by the descriptions of five other species, read virtually the same except for two statements, one that the labrum is shallowly hollowed out in *rufocastanea* and the other that the second abdominal segment in *fusca* has a swelling each side of the middle. Examination, however, proves that both types possess these characters. The tumidity of the abdomen is lacking in most specimens of *ingenua* from the United States, but this is not always a reliable character in *Diplotaxis*.

*Diplotaxis punctatorugosa* Blanchard

*Diplotaxis punctatorugosa* Blanchard, 1850, *Catalogue . . . ento-*

mologique . . . Paris, vol. 1, p. 171.

*Diplotaxis excavata* LeConte, 1856, Jour. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 3, p. 267. (New synonym.)

*Diplotaxis frontalis* LeConte, 1856, *ibid.*, vol. 3, p. 268. (New synonym.)

*Diplotaxis densicollis* Fall, 1909, Trans. Amer. Ent. Soc., vol. 35, p. 52. (New synonym.)

Type locality, Savannah, Georgia. Distribution, on the coast from South Carolina to Texas, also Oklahoma; Rhode Island (one specimen).

Although the types of these species have not been examined I feel sure, from the evidence given below, that they are all the same species, varying only in the density and rugosity of the pronotal punctures and in the presence or absence of a "rather broadly and deeply concave or impressed" area (Fall, p. 51) exteriorly on the basal margin of the pronotum, this area either opaque or glabrous. There is also some slight variability in the size and extent of the transverse ridge on the front of the head, but the ridge is always present. The type locality of *excavata* is either South Carolina, Georgia, Florida, or Louisiana (none was designated by LeConte); of *frontalis*, Georgia; of *densicollis*, South Carolina.

In Leng's catalogue (1920, p. 255) Blanchard's *punctatorugosa* appears at the end of the list of *Diplotaxis* without number, probably for the reason that Fall in his 1909 revision, after his discussion of *excavata*, *frontalis*, and *densicollis*, remarks that "the *punctatorugosa* of Blanchard is almost certainly one of these, but it is impossible to say which." Since the three forms are now considered as the same species they are therefore all referred to *punctatorugosa*. This is the only small eastern species in which the front of the head behind the clypeus is "transversely carinate" (Blanchard), the carina "medially impressed" (Fall). It is also the only eastern species with such a deep and definite impression at the base of the elytra within the humerus, and with the elytral punctation so coarse, dense, confused, and rugose that the costae are "rather inconspicuous" (Fall). The labrum is also unique, at least among the small eastern forms, in its absolutely flat surface which is strongly, densely punctured and is on the same plane as the underside of the clypeus. As Fall remarked in his discussion of *frontalis* (p. 51), "there is no possibility of confusing this species with any other except the two following [*excavata*, *densicollis*], one or both of which may indeed be only varietal forms of the present."

The pronotum with its large bulbous swelling at the sides at middle and its sinuation in front of the basal angles (when seen from above) is quite similar to the pronotum of some *subcostata* Blanchard (type locality, Savannah, Georgia), a species occurring in many of the same areas. The latter differs, in addition to the characters already stated, in its larger size (usually 11 mm. or more), virtually non-punctate scutellum, proportionately shorter clypeus, and by having the pronotum more narrowed in front. The claws in both species are bent and subapical.

A total of 60 specimens of *punctatorugosa* has been examined, including two homotypes of *excavata* (South Carolina, Florida), one homotype of *frontalis* (Meredith, South Carolina), and one of *densicollis* (Mt. Vernon, Alabama). In a series of 25 specimens from Beaufort, South Carolina, 11 are the glabrous variety (*frontalis*), the pronotum having "at most a very broad and feeble impression along the basal margin;" the 14 others have this impression not only deeply concave but also pruinose or opaque (*excavata* and *densicollis*), the pruinosity sometimes extending all the way across the base of the pronotum. This character is not sexual. In *hebes* Bates and an undescribed species from Mexico, with but nine segments in the antennae, both glabrous and pruinose individuals occur throughout the range of the species.

The pronotal punctuation in 24 of the 25 Beaufort specimens and in 15 others (Alabama, Mississippi, Louisiana, Florida, South Carolina, Texas), including the homotypes of *excavata* and *frontalis*, is very irregular, being generally much sparser on the disc at center and denser on the sides, but varying individually not only in the number of denser areas, but also in their location. Of the 18 remaining specimens, 14 (homotype of *densicollis*, 4 from South Carolina, 8 from Mississippi, one from Beaufort) have the pronotum so densely punctured and rugose that there are scarcely any smooth areas without punctures (one of the specimens, however, has the basal margin of the pronotum virtually unimpressed as in *frontalis*), one has the punctuation rather sparse, and three have it denser, but not quite so dense as in *densicollis* (one of the latter specimens also has the base deeply and opaquely excavate). The specimen from Rhode Island (Watch Hill) is of the *densicollis* form. The above evidence seems to show that intermediate individuals do occur among the three described forms (Fall had not seen any) and that they are all varieties of the same species.

#### The *brevidens* group

This is a small group of *Diplotaxis* species of medium to large

size (10 to 14 mm.) in which the males have long and abundant golden hairs on the inner side of the femora and tibiae and down the center of the abdomen. The tibial hairs can readily be seen on mounted specimens without the aid of magnification. The females, although lacking the abdominal patch of hairs, have long but much sparser hairs on the legs. Five forms in this group of species have been described but only three appear to be valid, *brevidens* LeConte, 1856 (type locality, Valley of the Gila, Arizona), *illustris* Fall, 1909 (type locality, Baboquivari Mountains, Arizona) and *fossipalpa* Fall, 1909.

*Diplotaxis fossipalpa* Fall

*Diplotaxis fossipalpa* Fall, 1909, Trans. Amer. Ent. Soc., vol. 35, p. 57.

*Diplotaxis villosipes* Fall, 1932, Jour. New York Ent. Soc., vol. 40, p. 193. (New synonym.)

Type locality, Phoenix, Arizona. Type in Museum of Comparative Zoology. Distribution, southern Arizona, southern California, and northern Sonora, Mexico.

In 1909 Fall had only females of *fossipalpa*, which he thought might prove to be the same species as *illustris* of which he had a male, but these two species are distinct as will be shown later. In 1932 he described *villosipes* (type locality, Holtville, California), on a single male, giving certain significant characters that he had not mentioned for *fossipalpa*. These characters were found to be present in two female topotypical homotypes of *fossipalpa* in the American Museum of Natural History and a further check on these characters through the kindness of Dr. Darlington at the Museum of Comparative Zoology shows that they are also represented in Fall's type of the species. Thus Fall's *villosipes* is the male of *fossipalpa*. The distinguishing characters, which are present in both sexes, are the round concavity in the center of the metasternum, and the exaggerated bulbous arc of the pronotal side margins. In *illustris* and *brevidens* the metasternum is evenly rounded as in other *Diplotaxis*, and the pronotal sides are not or scarcely sinuate before and behind the middle angulation, not prominently sinuate as in *fossipalpa*. The males of *fossipalpa* differ further from the males of the other two species, by having the unguis on the claws of the middle legs obsolete or very tiny, and the femora and tibiae abundantly hairy on all legs, not just on the front and hind legs.

The following specimens of *fossipalpa* have been examined: from

Phoenix, Arizona, 2 ♂, 5 ♀; from California: Blythe, 1 ♂, Palm Springs, 2 ♂, 3 ♀, Holtville, 1 ♂, 1 ♀, Cochella, 1 ♂, San Diego County, 1 ♀; from Mexico; Sonora: Puerto Penasco, 5 ♀.

*Diplotaxis brevidens* LeConte

*Diplotaxis brevidens* LeConte, 1856, Jour. Acad. Nat. Sci. Philadelphia, vol. 3, ser. 2, p. 272.

*Diplotaxis laeviscutata* Moser, 1918, Stettiner Ent. Zeit., vol. 79, p. 313. (New synonym.)

Type locality, Valley of the Gila. Type in Museum of Comparative Zoology. Distribution, Arizona and Sonora, Mexico.

The type of *laeviscutata* (type locality, Mexico), a male, has been examined and it agrees in all characters, including the male genitalia, with a male homotype of *brevidens* from Arizona and with 15 other male specimens from Tucson, Gillespie Dam, Phoenix, and Organ Pipe National Monument, Arizona, and with a male (dissected) from Tiburon Island, Sonora, Mexico. Only three females have been seen and these differ from the males by having the abdomen convex and without the center patch of longer hairs, the legs less hairy, the pygidium less transverse, and the first segment of the hind tarsi shorter than the longer of the tibial spurs, not the same length as in the males.

Moser placed his Mexican form near Fall's *illustris* (Arizona), which also has very hairy femora and tibiae on the front and hind legs. The two species are in fact closely related, and the females can scarcely be distinguished except for the generally smaller size of *brevidens* and the slight difference in the hind tarsal claws. The latter in *brevidens* are cleft nearer the middle and the tooth is placed more at right angles to the claw, seemingly without any fissure. The male of *brevidens*, however, has the hairs, especially on the abdomen, far less abundant than in the male of *illustris*, the abdomen not so strongly concave as in that species, the hind femora shorter, the genitalia not suddenly widened at the apex, and the front tarsi not fringed below with long sparse hairs. In series, a difference in the angle of the slope of the head can be discerned, and the punctuation of the second elytral interspace is usually more regular in *brevidens*, not confused as in most *illustris*. Both species are distinguished from *fossilpalpa* Fall (Arizona, southern California, northern Sonora), which also has hairy abdomen and legs in the male, by the absence of a round depression in the center of the metasternum and by the definitely less sinuous sides of the pronotum.